

# WATER QUALITY MEMORANDUM

Utah Coal Regulatory Program

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March 17, 2010

TO: Internal File

THRU: James D. Smith, Permit Supervisor *JS 03/18/10*

FROM: Steve Christensen, Environmental Scientist *SCC*

RE: 2009 Third Quarter Water Monitoring, Genwal Resources, Inc., Crandall Canyon Mine, Permit & Tracking #3377

Water monitoring requirements for the Crandall Canyon Mine can be found in Sections 7.31.21, *Ground Water Monitoring Plan* and 7.31.22, *Surface Water Monitoring Plan*. Additional information can be found in Tables 7-4, 7-5, 7-8, 7-9 and 7-10.

On August 6<sup>th</sup>, 2007, a major mine bump/bounce occurred in the Main West pillar section causing much of the working area of the mine to collapse. As a result, mining operations at the mine have ceased. The in-mine dewatering pumps were removed and temporary concrete block seals were constructed in the north portals.

Based on Division of Oil, Gas and Mining records (the Division), the mine encountered significant amounts of ground water and began pumping activities in 1996. Over a 14-year period, the mine pumped an average of 742 gallons of water from the mine workings. Following the mine collapse and subsequent sealing of the portals, the mine did not discharge for the months of October, November and December of 2007. However, by mid January of 2008 the mine had filled to the extent that the mine-water had found it's way around the temporary seals and began to discharge uncontrolled to the surface.

During the 1<sup>st</sup> quarter of 2008, spikes in Total Dissolved Solids (TDS) and Total Iron (T-Fe) were detected during Utah Pollutant Discharge Elimination System (UPDES) sampling of the mine water discharge (Outfall 002). The analytical results for both TDS and T-Fe for both the 2<sup>nd</sup> and 3<sup>rd</sup> quarter of 2008 were within the compliance limits established in the Permittee's UPDES discharge permit. However, analytical results for the 4<sup>th</sup> quarter of 2008 as well as the 1<sup>st</sup> and 2<sup>nd</sup> quarters of 2009 produced elevated levels of T-Fe while TDS levels stayed within compliance levels. See 'data irregularity' section below for more discussion. The 3<sup>rd</sup> quarter of 2009, followed the same trend. (*See Discussion Below*)

1. Was data submitted for all of the MRP required sites? YES ☒ NO ☐

***Springs***

*The approved MRP requires the monitoring of 24 springs each quarter. Of these 24 springs, 9 require laboratory water quality analysis (See Table 7-4). The remaining 15 springs require quarterly monitoring of field parameters (flow, pH, specific conductance and temperature).*

The Permittee submitted all required samples for the spring monitoring sites.

***Streams***

*The approved MRP requires the monitoring of 12 surface water/stream sites. Of these 12 surface water/stream sites, 9 require laboratory water quality analysis (See Table 7-8). The remaining 3 sites require quarterly monitoring of field parameters (flow, pH, specific conductance, temperature and dissolved oxygen).*

The Permittee submitted all required samples for the stream sites.

***Wells***

*The approved MRP outlines monitoring of 7 wells. According to Table 7-4, all 7 wells required quarterly laboratory water quality analysis. However, due to the mine disaster on August 6<sup>th</sup>, 2007, the active mine-workings have been temporarily sealed off thus rendering the wells inaccessible.*

***UPDES***

*The UPDES Permit/MRP (UT000024368) requires monthly monitoring of 2 outfalls: 001 and 002. Outfall 001 is associated with the discharge from the primary sediment pond at the main mine facility. Outfall 002 is associated with the mine-water discharge that reports directly to Crandall Creek.*

The Permittee submitted all required samples per the terms of the UPDES discharge permit.

2. Were all required parameters reported for each site? YES ☒ NO ☐
3. Were any irregularities found in the data? YES ☒ NO ☐

Three months following the sealing of the north portals, the mine water discharge began

to exhibit fluctuating levels of T-Fe and TDS at UPDES Outfall 002. The 1<sup>st</sup> quarter of 2008 produced analytical results that were outside the Permittee's UPDES compliances levels for both TDS and T-Fe.

However, during the 2<sup>nd</sup> and 3<sup>rd</sup> quarters of 2008, analytical results obtained for TDS and T-Fe from the mine-water discharge were within the compliance levels established by the UPDES discharge permit (1.0 ppm for T-Fe and 1,200 ppm for TDS).

The results from the 4<sup>th</sup> quarter of 2008 again produced levels of TDS below the UPDES standard of 1,200 ppm. However, T-Fe values had increased to levels beyond the 1.0 ppm range established in the UPDES permit (1.59 and 1.335 ppm respectively for 4<sup>th</sup> qtr., 2008). Mine-water analytical results for the 1<sup>st</sup> and 2<sup>nd</sup> quarters of 2009 were again a mixed bag of compliant TDS levels with elevated T-Fe levels.

The 3<sup>rd</sup> quarter of 2009 produced analytical data from Outfall 002 that follows the same trend as has been established in the last 4 consecutive quarters. TDS levels from three sampling events remained below compliance levels (743 ppm, 696 ppm and 707 ppm respectively). Conversely, T-Fe levels obtained from the three sampling events were all above the UPDES compliance level of 1 ppm (2.501 ppm, 2.331 ppm and 2.455 ppm).

In addition, the stream channel of Crandall Creek has begun to show significant evidence of iron staining. The Division issued a Notice of Violation (NOV #10043) on August 10<sup>th</sup>, 2009 for failure to minimize disturbance to the hydrologic balance. DWQ issued a Narrative Standard Violation on August 10<sup>th</sup>, 2009 as well for the iron staining now evidence in the Crandall Creek stream channel.

Work continues on determining an effective approach for knocking down the T-Fe levels to within compliant UPDES levels.

T-Fe levels measured below the mine facilities within the Crandall Creek drainage (Site LOF-1) rose significantly from the prior quarter continuing a weak upward trend that began during the 4<sup>th</sup> quarter of 2008 and 1<sup>st</sup> quarter of 2009 (1.438 ppm and 1.432 ppm respectively). The 2<sup>nd</sup> quarter of 2009 produced a T-Fe level of 0.679 at Site LOF-1. However, this quarter's results rose to 1.585 ppm. It would appear that the lower value obtained during the 2<sup>nd</sup> quarter of this year may have been an anomaly.

Spring SP-58 had produced several analytical results that were outside 2 standard deviations: D-Na (2.72 standard deviations), SO4 (2.41 standard deviations) and TDS (2.01 standard deviations) during the 4<sup>th</sup> Quarter of 2008. However since that time, the aforementioned parameters appear to have stabilized to within a normal range as exhibited by the data set.

Outfall 002 discharged an average of 297 gallons per minute (gpm) based on 3 sampling events conducted during the quarter. The Permittee submitted the required samples per the terms of the UPDES discharge permit.

**4. On what date does the MRP require a five-year re-sampling of baseline water data.**

Page 7-33 of the MRP states that groundwater samples collected during the low flow period (typically the 4<sup>th</sup> quarter) every 5 years will be analyzed for baseline parameters (See Tables 7-5). The 4<sup>th</sup> quarter of 2010 will be the next sampling event where baseline data will be required.

Page 7-35 of the MRP states that surface water samples collected during the low flow period every 5 years will be analyzed for baseline parameters (See Table 7-9). The 4<sup>th</sup> quarter of 2010 will be the next sampling event where baseline data will be required.

**5. Based on your review, what further actions, if any, do you recommend?**

Continued data collection and monitoring of the mine-water discharge will be necessary to evaluate the T-Fe levels.

Continue to work with the Permittee in identifying a mine-water treatment system that will effectively lower the T-Fe concentrations to compliant UPDES levels.

Maintain a close examination of T-Fe values within the Crandall Creek drainage (specifically surface water monitoring site LOF-1).

Work with other regulatory agencies in determining what if anything can be done to remove or mitigate the iron staining within the Crandall Creek stream channel (See Photos Below).

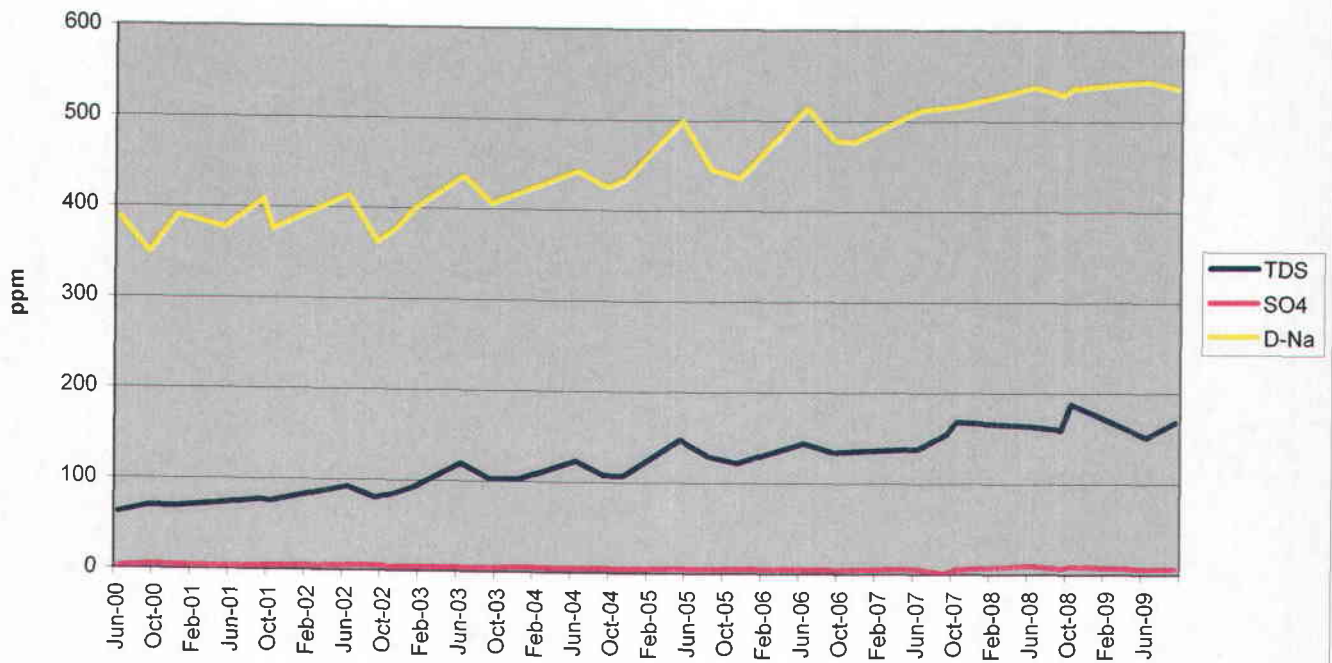


*Iron Staining Visible in Crandall Creek Drainage at Outfall 002*

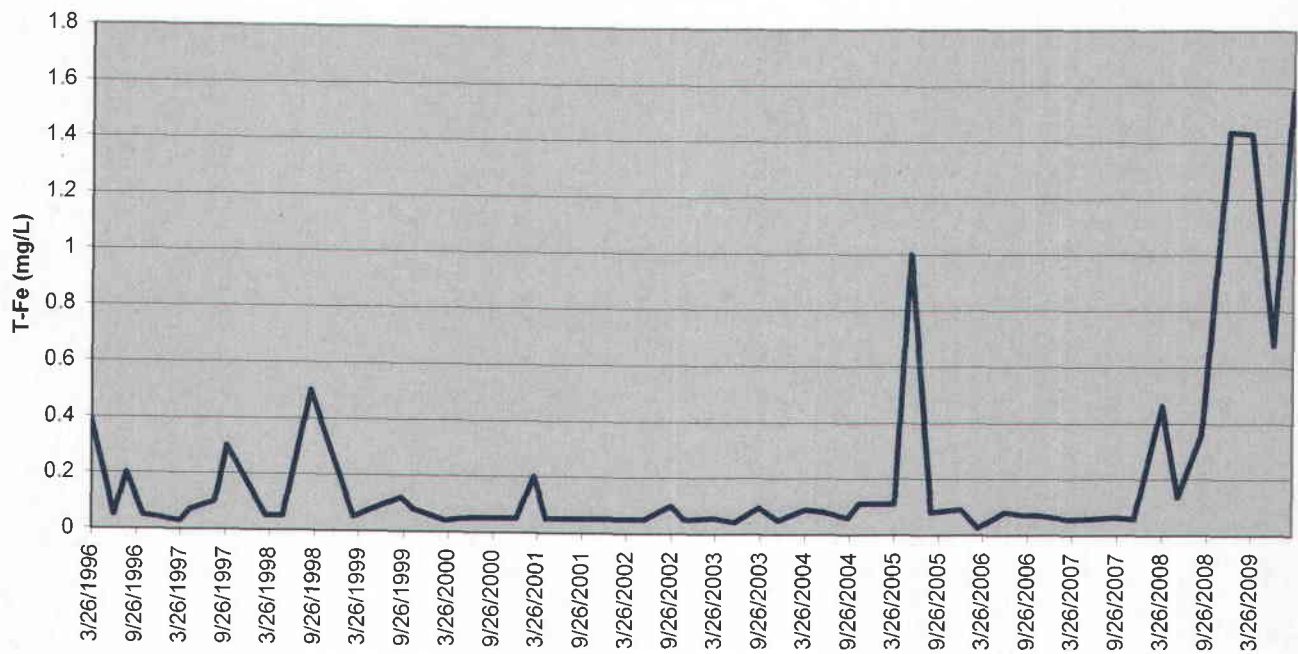


*Iron Staining of Crandall Creek Stream Channel Visible Downstream of Outfall 002*

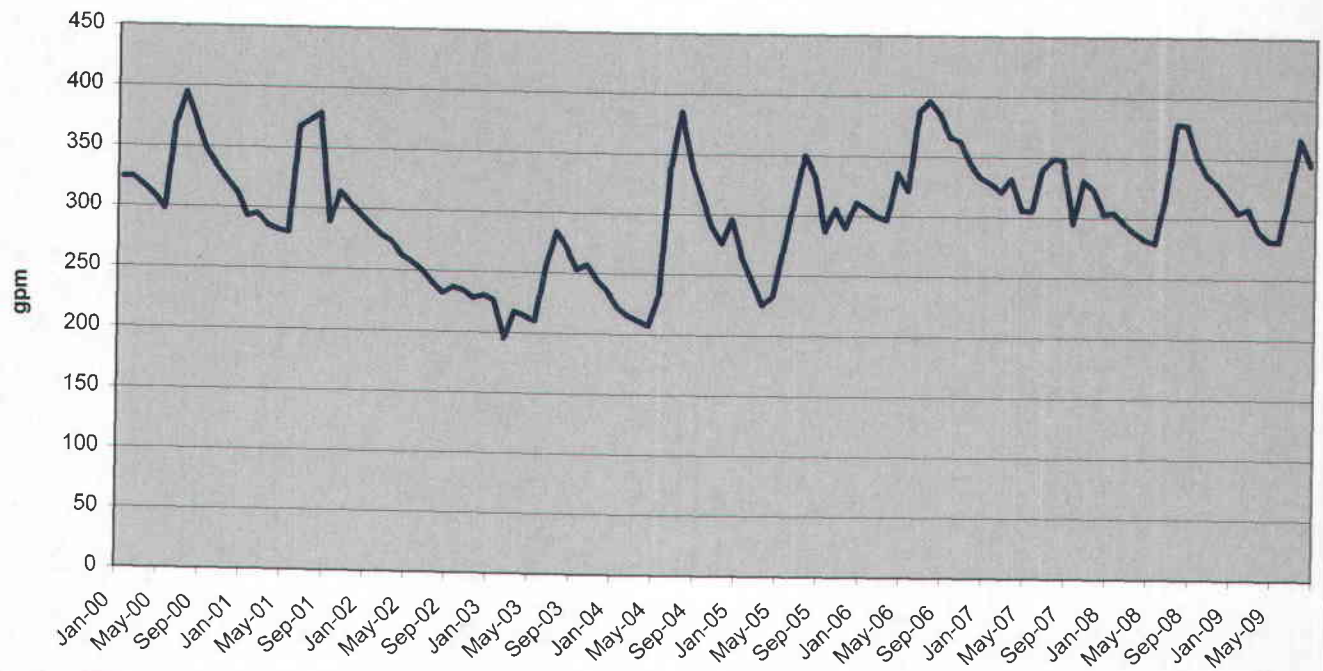
## Spring SP-58 Water Quality



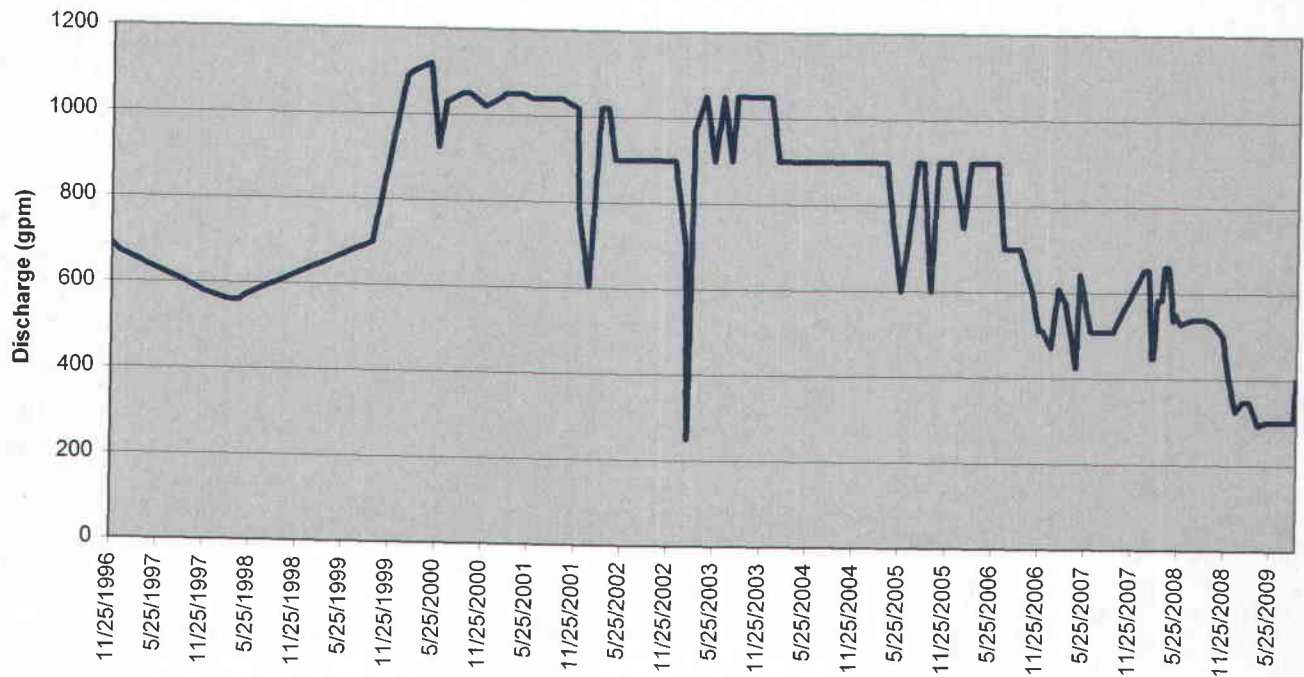
## Crandall Creek Lower Flume (LOF-1): Total Iron Levels



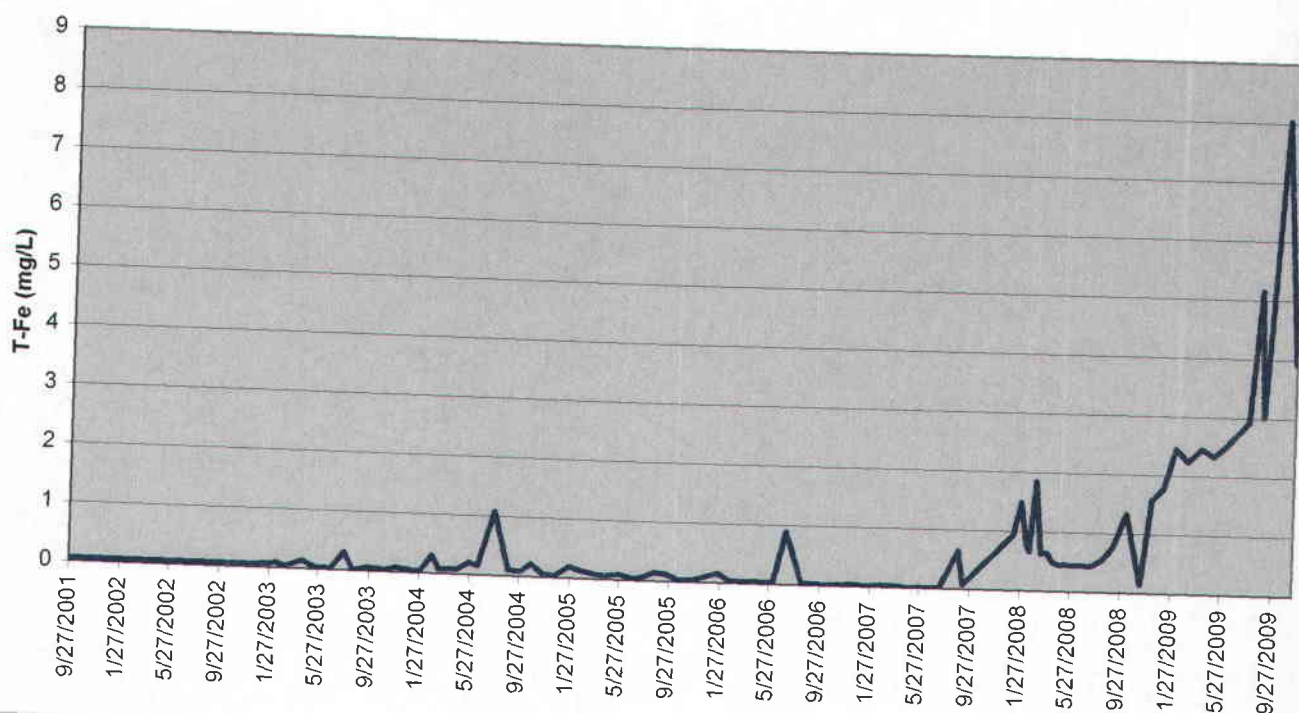
### Little Bear Spring Discharge



### Mine Water Discharge (Outfall 002)



**Total Iron (T-Fe): Outfall 002**



**Total Dissolved Solids (TDS): Outfall 002**

